AUTOMATED DRIVER DROWSINESS DETECTION SYSTEM

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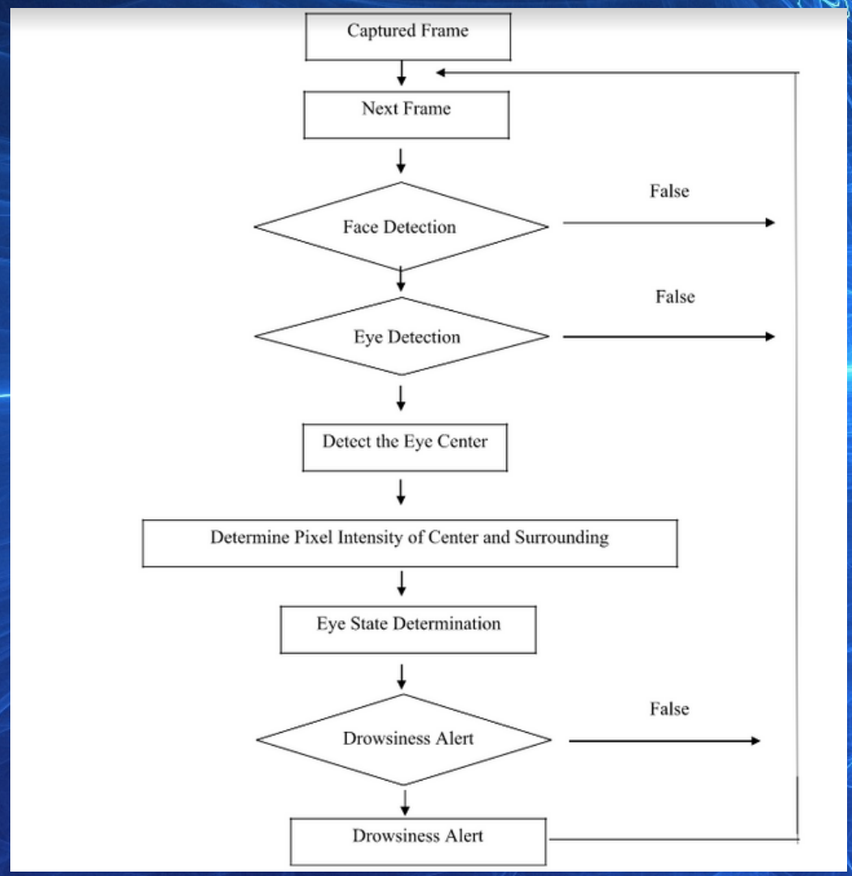
Summary: Every year many people lose their lives due to fatal road accidents around the world and drowsy driving is one of the primary causes of road accidents and death. The system records the videos and detects driver's face in every frame by employing image processing techniques. The system is capable of detecting facial landmarks, computes Eye Aspect Ratio (EAR) and Eye Closure Ratio (ECR) to detect driver's drowsiness based on adaptive thresholding. The feature point detector use 68-point facial landmark, but we constrain landmarks tothe convex hull. Results show high sensitivity of the algorithm in the tests performed on a vehicle with a webcam and a warning alert, and produced good results with more sensitive conditions.

Project Workflow

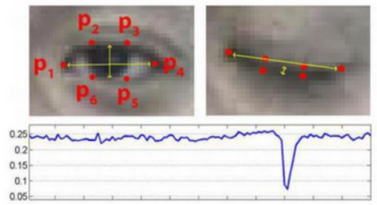


Solution Approach:

After procuring the live streaming of the driver's face, the system will convert it into frames for further processing. The Local Binary Pattern (LBP) algorithm will be applied for the detection of the face portion in the image i.e. the eyes Drowsiness will be determined from whether the eyes of the driver are closed for an instance of seconds. Through analysis of the eye states, the system will be able to differentiate a drowsy driver from a normal driver. Classifiers will then classify the state of the eye features and face location of the driver. If a drowsy driver is detected an alarm will be raised, until the system notices the driver is alert. A python script is run through the kernel which also contains the eye detection trained model which will help in recognizing whether the driver is drowsy or not.

Findings:

The system was found efficiently detecting fatigue measuring the eye aspect ratio and subsequently authenticating the driver. In cases where drowsiness was detected an alarm was formulated in addition the face of the assigned driver is also authenticated accurately to ensure safety and security of the vehicles.



$$EAR = (|p2-p6| + |p3-p5|)/2*(|p4-p1|)$$

References:

[1] K. Cen, "Study of viola-jones real time face detector," 2018.

[2] D. Huang, C. Shan, M. Ardabilian, Y. Wang, and L. Chen, "Local binary patterns and its application to facial image analysis: a survey," IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews), vol. 41, no. 6, pp. 765-781, 2011.